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Electronic Patent Application Submission

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First Named Inventor:	Jesse Aronstein
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SELF-ALIGNING ULTRASONIC DISPLACEMENT SENSOR SYSTEM, APPARATUS AND METHOD FOR DETECTING SURFACE VIBRATIONS

First Named Inventor: Mr. Jesse Aronstein

SUBMITTED BY

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Electronic Information Disclosure Statement

SELF-ALIGNING ULTRASONIC DISPLACEMENT SENSOR SYSTEM, APPARATUS AND METHOD FOR DETECTING SURFACE VIBRATIONS

Application:	09/683502
Confirmation:	6673
Applicant(s):	Jesse Aronstein
Docket Number:	ARONP002US
Group Art Unit:	
Examiner:	Jeffrey Donels
search string:	(3595084 or 4453448 or 4457203 or 4589324 or 4702112 or 4741242 or 4926693 or 5155212 or 5272908 or 5355130 or 5373742 or 5457640 or 5804698 or 5808177 or 6317169).pn.

US Patent Documents

Note: Applicant is not required to submit a paper copy of cited US Patent Documents

init	Citation No.	Patent Number	Date	Bar Code	Patentee	Class	Subclass
	P01	3595084	1971-07-27		Bailey et al.	73	398
	P02	4453448	1984-06-12		Miesak	84	454
	P03	4457203	1984-07-03		Schoenberg, et al.	84	454

	P04	4589324	1986-05-20		Aronstein	84	454
	P05	4702112	1987-10-27		Lawrie, et al.	73	629
	P06	4741242	1988-05-03		Aronstein	84	454
	P07	4926693	1990-05-22		Holm-Kennedy, et al.	73	597
	P08	5155212	1992-10-13		Dubler, et al.	530	380
	P09	5272908	1993-12-28		Soss	73	35.14
	P10	5355130	1994-10-11		Luber	340	870.14
	P11	5373742	1994-12-20		Terhune	73	606
	P12	5457640	1995-10-10		Foller, et al.	702	56
	P13	5804698	1998-09-08		Belonenko, et al.	73	1.83
	P14	5808177	1998-09-15		Bonnefoy	73	1.82
	P15	6317169	2001-11-13		Smith	348	744

Remarks

(Remarks are not for responding to an office action.)

US 3,595,084 appears to disclose, essentially, an analog-to digital converter. It employs a pair of oscillators, one or both of which are varied in frequency to correspond to an analog (transducer) input capacitance, and provides output pulses at a frequency equal to the difference between the frequencies of the two oscillators. It does not disclose, suggest or motivate any means for detecting the distance to a surface and resolving the oscillation waveform of that surface in the manner of applicants' disclosure, nor does it disclose, suggest or motivate any automatic self-calibration that is necessary for utilizing an ultrasonic frequency to detect acoustic frequency vibrations of a surface at a variable distance between the transducers and the surface of interest. US 4,453,448 appears to disclose a sensor that measures tension in the mechanism that adjusts the tightness of the drum head, providing indication on a meter that can only be approximately calibrated to the actual note being sounded. It not disclose, suggest or motivate any means for sensing actual vibrations (sound producing means) or resolving the oscillation waveform of the drumhead . Commonly-invented US 4,457,203 appears to disclose a signal conditioning method for resolving the fundamental vibrating frequency of a complex acoustic waveform, means for identifying the corresponding musical note and its intonation (sharp or flat), and means for displaying that information to the player of the musical instrument. An alternate peak detector circuit is used to identify the fundamental frequency. Other than standard commercial microphones or musical instrument electronic pickups, it does not have any means for specifically sensing the vibrations of a surface (the timpani drum head) in isolation from other concurrent sound producing instruments. It does not disclose, suggest or motivate sensing of vibration of a surface by extracting a representation signal, nor does it disclose,

suggest or motivate self-calibrating a sensing of vibration of a surface by extracting a deviation signal and shifting a reference signal relative to a reflected signal in response to the deviation signal, in the manner that is disclosed and claimed by applicants. Commonly-assigned and invented US 4,589,324, discussed in applicants' disclosure, appears to disclose a specific (Liquid Crystal) display that shows the instrument player the note being played and the intonation (sharp or flat). It does not deal with the means for sensing the sound (or vibrations) produced by the instrument or the methods of resolving the acoustic signal relative to the standard musical scale or into any vibrational waveform. US 4,702,112 appears to disclose a method for comparing a generated ultrasonic signal, and viewing the resultant echo from the target material. This is then displayed on a CRT, and the user passes judgment on the target material. This primarily relates to finding structural flaws in materials. It appears to disclose a distance and quality of reflection measurement apparatus. It does not measure vibration. It does not disclose, suggest or motivate and means to detect a dynamic change in, e.g., a drumhead position, which as disclosed and claimed by applicants, is then used to determine frequency of target vibration. Nor does it disclose, suggest or motivate self-calibrating / aligning a sensing of vibration of a surface by extracting a deviation signal and shifting a reference signal relative to a reflected signal in response to the deviation signal to allow the phase detector to work in an optimum area, in the manner that is disclosed and claimed by applicants. Commonly-assigned and invented US 4,741,242, discussed in applicants' disclosure, appears to disclose a sensing element that reflects infra-red light off a target (if needed) on the drumhead, creating a signal representing the drumhead vibrations. Said signal is then analyzed and displayed to the player, including indication of both the note being sounded and the accuracy of tuning. This operates by reflecting light from the surface of the drum or reflective target. This patent does not disclose, suggest or motivate ultrasonic sensing means, either with or without automatic self-calibration, to detect and reconstruct the varying distance between the drumhead and the sensor. US 4,926,693 appears to disclose measuring the impedance of a crystal as a function of mechanical excitement, which is a method of measuring a distance. It is important to observe that this measures position, not frequency. This patent requires a varying frequency to determine the resonate point of piezo electric crystal. It does not disclose, suggest or motivate detecting the dynamic change in position, which is what applicants use to determine the frequency of the target vibration. US 5,155,212 appears to disclose a mechanical apparatus for applying and varying the drumhead tension, under control of the player. It does not disclose, suggest or motivate any means for sensing the actual head vibration (musical sound) that is produced. US 5,272,908 appears to disclose the measurement of the distance of the burn front of a rocket motor flame. It is basically a phase comparison used to measure distance. It does not measure the vibration of the flame front, just its position. It does not disclose, suggest or motivate detecting the dynamic change in position, which is what applicants use to determine frequency of target vibration. US 5,355,130 appears to disclose a method for sequentially operating various ultrasonic sensors so that they do not interfere with each other. It is analogous to requiring the other three people at a four-person table to be quiet and listen, while the first is talking. It does not disclose, suggest or motivate detecting the dynamic change in position, which is what applicants use to determine frequency of target vibration. US 5,373,742 appears to disclose the measurement of the properties of a thin film of material, where the reflections from both the front and back of the material are compared. It measures the properties of a thin film, so as to determine its thickness. It does not disclose, suggest or motivate detecting the dynamic change in position, which is what applicants use to determine frequency of

target vibration. US 5,457,640 appears to disclose measuring the ultrasonic acoustic signature of a condensate discharger, and comparing it with a known good signature. Applicants do not look at an acoustical signature. This patent does not disclose, suggest or motivate detecting the dynamic change in position, which is what applicants use to determine frequency of target vibration. US 5,804,698 appears to disclose looking for a resonate frequency which is used to evaluate the properties of a target material. It thus measures the physical properties of the target. It does not disclose, suggest or motivate detecting the dynamic change in position, which is what applicants use to determine frequency of target vibration. US 5,808,177 appears to disclose a method of calibrating and controlling a phased grid of ultrasonic transmitters and a receiver (or receivers) used to determine position of an object in the detection range of the transducer array. It does not disclose, suggest or motivate means for resolving an acoustic vibrational frequency from the reflected ultrasonic signal, nor does it disclose, suggest or motivate means for optimizing or calibrating such signal dynamically as the distance between the transducers and the vibrating surface varies. US 6,317,169 appears to disclose a jitter device for projection devices, to reduce apparent speckle. This is not a measurement device of any sort. None of these patents disclose, suggest or motivate sensing of vibration of a surface by extracting a representation signal of physical position of the surface for measuring the frequency at which the surface is vibrating, nor do any of these patents disclose, suggest or motivate self-calibrating / aligning a sensing of vibration of a surface by extracting a deviation signal and shifting a reference signal relative to a reflected signal in response to the deviation signal to allow a phase detector to work in an optimum area, in the manner that is disclosed and claimed by applicants.

Signature

Examiner Name	Date